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| 10/634,835 | 08/06/2003 | Vladimir Vladimirovich Popov | BOE01 020 | 8621 |

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MARK C. COMTOIS
Duane Morris LLP
Suite 700
1667 K Street, N.W.
Washington, DC 20006

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| EXAMINER |
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MULLINS, BURTON S

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| ART UNIT | PAPER NUMBER |
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2834

DATE MAILED: 06/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|---|---|-----------|
| Office Action Summary | Applicant(s) 10/634,835 | Applicant(s) POPOV, VLADIMIR VLADIMIROVICH | |
| | Examiner Burton S. Mullins | Art Unit 2834 | <i>AW</i> |
| | -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -- | | |

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 24 September 2003.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-21 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 06 August 1993 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some * c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 31 May 2004 has been considered by the examiner.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the 'concave shape between two adjacent permanent magnets' (claim 15) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: The 'inner opening' 62.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 70 (Fig.3).

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to

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avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-2, 4, 6-8, 12, 14, 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kaneko et al. (US 6,441,524). Kaneko teaches a rotor for an electric machine comprising: a body 11 of generally cylindrical shape (Fig.8) said body having an inner opening (not numbered, for shaft 13), wherein a plurality of slots are provided in the body, the said plurality of slots extending from the said inner opening towards the outer periphery of the said body; permanent magnets 73 disposed in said plurality of slots; wherein at least one of the said plurality of slots comprises an end section or “hollow part” 83 near the outer periphery of the said body, the end section having an area of enlarged width to reduce leakage flux (c.5, lines 23-26).

Regarding claim 2, the end sections 83 are closed.

Regarding claims 4 and 19-20, the permanent magnets 73 “extend into the” hollow parts 83, i.e., the magnets and hollow parts share a region the same radial distance from the periphery. Further, the magnets “partially extend” into the hollow parts in that they do not fill up the hollow parts entirely.

Regarding claims 7 and 14, the slots and magnets therein extend generally radially.

Regarding claim 13, the hollow parts comprise “recesses”.

6. Claims 1-2, 4-8, 12-14 and 16-20 are rejected under 35 U.S.C. 102(a/e) as being anticipated by Tajima et al. (US 6,445,100). Tajima teaches a permanent magnet machine including: a rotor body 30 of generally cylindrical shape said body having an inner opening (for shaft 38, Figs.1&2), wherein a plurality of slots 34' are provided in the body (Fig.9), the said plurality of slots extending from the said inner opening towards the outer periphery of the said body (Fig.9); permanent magnets 36 disposed in said plurality of slots (Fig.9); wherein at least one of the said plurality of slots comprises an end section or slits 62/64 near the outer periphery of the said body, the end section having an area of enlarged width (c.7, lines 13-15).

Regarding claim 2, the end sections or slits 62/64 are closed.

Regarding claims 4 and 19-20, the permanent magnets 36 “extend into the” slits 62/64, i.e., the magnets and slits share a region with the same radial distance from the periphery. Further, the magnets “partially extend” into the slits in that they do not fill up the slits entirely.

Regarding claim 5, note that a non-magnetic material comprising varnish is injected into the slits and surrounds the magnets (c.7, lines 20-30).

Regarding claims 7 and 14, the slots and magnets therein extend generally radially.

Regarding claim 13, the slits 62/64 comprise “recesses”.

7. Claims 1, 3, 5-10, 12, 14, 16-18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 1,503,708. GB '708 teaches a rotor for an electric machine comprising: a body 200 of generally cylindrical shape (Figs.1a-1b), said body having an inner opening 206 wherein a plurality of slots 201 are provided in the body, the said plurality of slots extending from the said inner opening towards the outer periphery of the said body; permanent magnets 203 disposed in said plurality of slots; wherein at least one of the said plurality of slots comprises an end section 201' near the outer periphery of the said body, the end section having an area of enlarged width (see. Figs.1a-1b).

Regarding claim 3, the magnets 203 terminate short of the end sections 201'.

Regarding claim 5, the end sections 201' are filled with cast aluminum (p.3, lines 48-79).

Regarding claim 6, the laminated body 200 with magnets 203 together form a magnetic core.

Regarding claim 7 and 14, the slots and magnets generally extend radially.

Regarding claim 8, the inner opening 206 is for a shaft 204.

Regarding claims 9-10, the aluminum surrounding the rotor shaft 204 forms a non-magnetic "hub" between the core laminations 200 and the shaft 204.

Regarding claim 21, the magnets do not extend into sections 201'.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over any one of Kaneko, Tajima or GB '708 in view of Asano (JP 2001-52534). Neither Kaneko, Tajima nor GB '708 teach an outer periphery of the rotor having a convex shape between two magnets.

Asano teaches a permanent magnet rotor including magnets 11 and core 16 formed so that the outer diameter is larger at the center of the poles and smaller at the boundaries between the poles (abstract). This reduces flux loss and distortion of induced voltage.

It would have been obvious to modify and provide an outer periphery of the rotor with a convex shape per Asano since this would have been desirable to reduce flux loss and distortion of induced voltage.

10. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima in view of Yamamoto et al. (EP 1-164684). Tajima does not teach an outer periphery of the rotor having a concave shape between two magnets.


Yamamoto teaches a permanent magnet rotor including magnets 1 (Figs.1-2) disposed in core 3, wherein the outer periphery F of the rotor has concavities (generally denoted by 'end portions' c) formed thereon, between adjacent magnets 1, such that the rotor periphery forms a curve of a hyperbolic function to reduce motor inductance (abstract).

It would have been obvious to modify and provide an outer periphery of Tajima's rotor with a concave shape per Yamamoto since this would have been desirable to reduce motor inductance.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Burton S. Mullins whose telephone number is 571-272-2029. The examiner can normally be reached on Monday-Friday, 9 am to 5 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on 571-272-2034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Burton S. Mullins
Primary Examiner
Art Unit 2834